REMARKS

Reconsideration of this application and entry of this Amendment is respectfully requested.

Claims 1-15, 18-19 and 23 have been cancelled without prejudice.

New claims 26-36 have been added.

New independent method claim 26 recites the method for preparing the magnesium-zirconium master alloy. Support for this claim can be found in the specification on page 8, lines 6-7; page 7, lines 21-25; page 20, lines 3-5; page 9, lines 12-16 and 23-29; page 16, line 26 to page 17, line 2; page 9, lines 5-10 and page 20 lines 19-21.

Support for claim 27 can be found in the specification on page 8, lines 21-34; support for claim 28 can be found on page 9, lines 33-34; support for claim 29 can be found on page 10, lines 4-6; support for claim 30 can be found on page 10, lines 18-20; support for claim 31 can be found on page 11, lines 4-7; support for claim 32 can be found on page 10, lines 10-14; support for claim 33 can be found on page 8, lines 21-22; support for claim 34 can be found on page 20, lines 3-5; support for claim 35 can be found on page 10, lines 6-7; and support for claim 36 can be found on page 9, lines 5-10. No new matter has been added.

Claims 16, 17, 21 and 22 have been rejected under 35 USC § 103 as unpatentable over GB 734,614 ("GB 614") in view of *Christodoulou et al* (U.S. 4,751,048). This ground of rejection is respectfully traversed.

An important aspect of applicants' claimed invention is that 90% of the zirconium particles in the magnesium-zirconium master alloy are sized less than 5 microns (μm). The important advantage of having zirconium particles sized less than 5 microns in the magnesium-zirconium alloy is that the zirconium particles are

substantially evenly distributed in the magnesium-zirconium melt that is then cast into the magnesium-zirconium master alloy.

The even distribution of the zirconium particles in the magnesium-zirconium master alloy is important and advantageous because zirconium particles less than 5 microns in size provide an advantageous zirconium particle size for nucleating magnesium grains during solidification when the master alloy is later used to prepare a magnesium alloy. The master alloy having zirconium particles of less than 5 microns in size provides more efficient use of the zirconium. The Example in the specification on page 21, lines 9-30 demonstrates this improvement with the preparation of a magnesium-zirconium alloy from a magnesium-zirconium master alloy and shows this improvement by the excellent grain refinement of the magnesium from 10,000 μm to 98 μm (page 21, lines 26-30).

In contrast, larger particles of zirconium have a strong tendency to settle in a magnesium melt unless stirred vigorously. The larger the particle size, the faster the zirconium settles to the bottom of the magnesium melt. For example, a 15 micron zirconium particle settles quickly to the bottom of a magnesium melt, whereas zirconium particles sized less than 3 microns were readily suspended in the magnesium melt. See the specification at page 6, line 28 to page 7, line 2.

There is no disclosure or suggestion in GB 614 of the important advantages gained by the substantially even distribution of zirconium particles sized less than 5 μm in the master alloy.

The Examiner admits at the bottom of page 3 to the top of page 4 of the Office Action that GB 614 does not disclose a magnesium-zirconium master alloy wherein 90% of the zirconium particles are sized less than 5 μm, and by implication GB 614 does not recognize the important influence that zirconium particles sized less than 5 μm have in producing an improved magnesium-zirconium alloy by using the

claimed master alloy as the source of zirconium. See the specification at page 21, lines 10-30.

Recognizing the deficiencies of GB 614, the Examiner then relies on *Christodoulou* in an effort to resolve these deficiencies. However, *Christodoulou* has little if any relationship to magnesium-zirconium alloying. *Christodoulou* discloses a method of dispersing ceramic and intermetallic particles in a metal matrix to form composite materials. Zirconium is disclosed in *Christodoulou* as a "solvent" metal (column 10, lines 60-65). Zirconium does not have a "solvent" function in applicants' claimed invention.

There are 29 Examples in *Christodoulou*. See column 29, line 61 to column 28, line 68. None of the Examples relate to a magnesium-zirconium master alloy. Table 1 of *Christodoulou*, bridging columns 29 and 30, summarizes almost 70 different reactant systems in which ceramics/intermetallic particles such as titanium boride and zirconium boride are dispersed into metallic matrices such as aluminum, copper and magnesium. None relate to magnesium-zirconium master alloys.

It is respectfully submitted that *Christodoulou* would be of no relevance or assistance to a person skilled in the art of magnesium alloying concerned with the problems of using magnesium-zirconium master alloys to alloy zirconium with magnesium.

Accordingly, there does not appear to be any obvious incentive to a person skilled in the art to combine GB 614 and *Christodoulou* in a manner that would collectively suggest the claimed invention. Therefore, reconsideration and withdrawal of this ground of rejection is respectfully requested.

Claims 20, and 23-25 have been rejected under 35 USC § 103 as unpatentable over GB 734,614 ("GB 614"). This ground of rejection is

respectfully traversed. Claims 20, and 23-25 were originally rejected as being product by process claims.

Claim 23 has been cancelled and replaced by new claim 26 in independent format. New dependent method claims 27 to 35 have been added. The dependency of claim 20 has been amended to depend from independent method claim 26.

It is respectfully submitted that claims 20 and 26-35 are patentably distinct from GB 614. The method disclosed in GB 614 is vastly different from applicants' claimed invention.

GB 614 relates to a process of reacting a relatively large mass of zirconium chloride with magnesium or a magnesium based alloy, lowering the temperature of the salt metal mixture to at least partially solidify any molten metal, removing the magnesium chloride, and reheating the metallic residue and removing any liquid alloy having a low zirconium content. See page 1, lines 71-79.

In contrast, applicants' claimed invention has completely different parameters. Elemental zirconium sponge is treated with a source of fluoride irons to form a treated zirconium sponge comprising a porous agglomerate of zirconium particles having a surface layer of fluorine-containing compounds partially coating a portion of the zirconium particles.

The treated zirconium sponge particles are then used to form a magnesium-zirconium melt by contacting the sponge particles with a molten magnesium/magnesium alloy at a temperature sufficient to disintegrate the zirconium sponge particles in the molten magnesium/magnesium alloy to form a magnesium-zirconium melt, wherein the zirconium particles are substantially evenly distributed and suspended in the magnesium zirconium melt. The

magnesium zirconium melt is then cast into a mold to form the magnesium-zirconium master alloy.

GB 614 relates to totally different methodology and contains no obvious basis for suggesting the claimed invention in an obvious manner. GB 614 discloses zirconium chloride as the source of zirconium. Zirconium chloride has a much lower melting point than magnesium. Therefore zirconium chloride would readily melt upon its addition to molten magnesium, whatever its particle size. The use of zirconium chloride also leads to a vaporization problem inherent in the method of GB 614, which is not a matter of concern in the claimed invention because applicants' claimed invention uses elemental zirconium as the source of zirconium. Elemental zirconium has a significantly higher melting point than magnesium. Accordingly, reconsideration and withdrawal of this ground of rejection is respectfully requested.

In view of the above amendments to the claims and arguments presented herein, it is respectfully submitted that this application is now in condition for allowance and such favorable action is respectfully requested.

Respectfully submitted,

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RODMAN & RODMAN
10 Stewart Place – Suite 2CE
White Plains, New York 10603

Telephone: (914) 949-7210
Facsimile: (914) 993-0668
e-mail : rodrod@rodman-rodman.com

/Charles Rodman/
Charles B. Rodman, Reg. No. 26,798
Attorney for Applicants

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